

## Patent Abstracts of Japan

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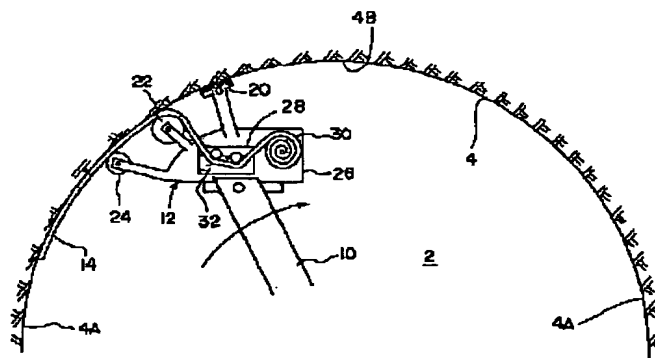
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INT.CL. : E21D 11/10

TITLE : CONSTRUCTION METHOD OF  
TUNNEL



ABSTRACT : PROBLEM TO BE SOLVED: To make it possible to speed the progress of tunnel work and to reduce working hours at a low cost.

SOLUTION: The tunnel wall surface 4 and hard rock are excavated by means of blast and mechanical excavator, and rock pieces on the tunnel wall surface are eliminated with pick, etc. An operating section 12 is provided to the front end of an arm 10, and the operating section 12 is equipped with cleaning section 20, pushed roller 22 of a reinforced body 14, heating roller 24, etc. In the cleaning section 20, water washing of the tunnel wall surface 4 is carried out by mop, etc. Then, hot wind is blown against the tunnel wall surface 4 to dry. Then, the cloth reinforced body 14 impregnated with an adhesive 32 is pushed against the tunnel wall surface 4 by the pushed roller 22, and then, the reinforced body 14 is heated with the heating roller 24, the adhesive 32 is solidified with them, the cloth reinforced body 14 is stuck on the tunnel wall surface 4, and the tunnel wall surface is borne on the reinforced body 14.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] In case this invention carries out tunnel excavation of the hard rock with a mountain tunneling method etc., it relates to the suitable tunnel construction approach.

[0002]

[Description of the Prior Art] The procedure which excavates a tunnel with a mountain tunneling method is as follows.

1. Shot or a mechanical excavator performs tunnel excavation.
2. Process the loose part of rock of a tunnel wall surface with a pick etc.
3. Build the steel support which bent the H beam etc. according to the tunnel configuration on a tunnel wall surface.
4. Spray concrete on a tunnel wall surface in predetermined thickness.
5. Make the sprayed concrete side penetrate and place a rock bolt.
6. Place lining concrete.

Usually, repeatedly, it follows and 6 is worked every less than 1.5m of the tunnel advance by the above-mentioned procedure of 1-5. And a standardization tends to take such a conventional method of construction to some extent.

[0003]

[Problem(s) to be Solved by the Invention] However, by such conventional method of construction, there was a problem on which a routing counter cannot bring forward many tunnel progress of work. Moreover, by the tunneling work of a hard rock, the above-mentioned activity of 3 to 5 may be unnecessary, and there was a problem which becomes uneconomical in the standardized conventional procedure. This invention is thought out in view of said situation, and the purpose of this invention can bring the tunnel progress of work forward, and working hours are shortened, and it is in offering the tunnel construction approach that a cost cut can be aimed at.

[0004]

[Means for Solving the Problem] In order to attain said purpose, this invention is faced placing lining concrete on the tunnel wall surface on which tunnel excavation of the hard rock was carried out with shot or a mechanical excavator, it was excavated, and the loose part of rock was processed, and building a tunnel, a blanket-like reinforcement object is stuck on said tunnel wall surface with adhesives, it fixes to it, a tunnel wall surface is supported with a blanket-like reinforcement object, and it carries out having placed said lining concrete from this blanket-like reinforcement object as the description.

[0005] Moreover, before this invention sticks said blanket-like reinforcement object on a tunnel wall surface with adhesives, it is characterized by performing cleaning which removes dust from a tunnel wall surface. Moreover, this invention is characterized by being pressurized, after quick setting nature adhesives are used as said adhesives and a blanket-like reinforcement object is stuck on a tunnel wall surface by adhesives. Moreover, this invention is characterized by being heated, after thermosetting adhesive is used as said adhesives and a blanket-like reinforcement object is stuck on a tunnel wall surface by adhesives. Moreover, this invention is characterized by said blanket-like reinforcement object having wrap die length for the both-sides side and top face of a tunnel wall surface at least by predetermined width of face.

[0006] In this invention, a tunnel wall surface is supported with a blanket-like reinforcement object after the conventional loose-part-of-rock processing. Namely, and supporting a tunnel wall surface with a blanket-like reinforcement object can fully protect fall of a pebble, and a small thing becomes possible [ skipping conventional 3-conventional 4, or the work habits of 3-5 ], brings advance of a tunnel forward, and, as for the loose part of rock which falls after tunnel excavation in the tunneling work of a hard rock, can aim at shortening of working hours, and a cost cut.

[0007]

[Embodiment of the Invention] Hereafter, the example of this invention is explained based on a drawing. Drawing 1 shows the sectional view of a tunnel. The tunnel whose 2 excavated the hard rock with shot or a mechanical excavator, and 4 show the wall surface, and, as for the tunnel wall surface 4, processing of a loose part of rock is made with the pick etc. 10 is the arm rocked in a vertical plane, the activity section 12 is formed in the point section of an arm 10, and attachment of cleaning of the tunnel wall surface 4 and the blanket-like reinforcement object 14 to the tunnel wall surface 4 is performed by the activity section 12.

[0008] The activity section 12 is equipped with the cleaning section 20, the forcing roller 22 of the reinforcement object 14, and heating roller 24 grade. Moreover, the reinforcement object roll 30 around which the adhesives container 28 is supported inside the frame 26 of the activity section 12 so that a level condition may always be maintained, and the reinforcement object 14 was wound is supported. After being immersed in adhesives 32 within the adhesives container 28 from the reinforcement object roll 30, it lets out the reinforcement object 14 to the forcing roller 22. By rocking of

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said arm 10, the cleaning section 20, the forcing roller 22, and a heating roller 24 are moved along with the tunnel wall surface 4.

[0009] And in the cleaning section 20, backwashing by water is performed by the mop etc., and, subsequently hot blast is sprayed and dried. Next, with the forcing roller 22, the blanket-like reinforcement object 14 which sank in adhesives 32 is pushed against the tunnel wall surface 4, the reinforcement object 14 is heated by the heating roller 24, adhesives 32 harden by these, and the blanket-like reinforcement object 14 is attached and fixed to the tunnel wall surface 4.

[0010] Cleaning of the tunnel wall surface 4 is performed so that the blanket-like reinforcement object 14 may be certainly stuck on the tunnel wall surface 4 by adhesives 32, and dust etc. is removed from the tunnel wall surface 4. As a blanket-like reinforcement object 14, the band-like thing of the magnitude whose width of face thickness is about 10-50cm in about 1-20mm is used, for example. As an ingredient of the blanket-like reinforcement object 14, various ingredients, such as cotton, a synthetic fiber, a glass fiber, or a thing with which these were mixed, are used, and an ingredient with large tensile strength is desirable.

[0011] Thermosetting adhesives [ adhesives / 32 ], such as epoxy resin adhesive and urethane resin system adhesives, are used. And ranging from the pars intermedia to top-face 4B of the both-sides sides 4A and 4A of tunnel 2, the blanket-like reinforcement object 14 lets out from the forcing roller 22, the blanket-like reinforcement object 14 is pressed against the tunnel wall surface 4 with the forcing roller 22, and adhesion with the blanket-like reinforcement object 14 and the tunnel wall surface 4 is made more certainly. Furthermore, by pressing heating roller 24 grade against the pasted-up blanket-like reinforcement object 14, hardening of adhesives 32 is brought forward and anchoring of the blanket-like reinforcement object 14 can be completed at an early stage.

[0012] And as such anchoring of the blanket-like reinforcement object 14 is shown in a multiple-times deed and drawing 2 along with the longitudinal direction of a tunnel. If two or more trains formation of the blanket-like reinforcement object 14 is carried out (i.e., if the tunnel wall surface 4 is supported by width of face of about 1.5 meters with the blanket-like reinforcement object 14) Next concrete shuttering is built into the tunnel wall surface 4 supported with the blanket-like reinforcement object 14 inside, concrete is placed between the blanket-like reinforcement object 14 and concrete shuttering, and lining concrete is formed on the blanket-like reinforcement object 14. And such an activity is repeated and the tunnel is built.

[0013] In the tunneling work of a hard rock, the loose part of rock which falls after tunnel excavation has many small things, and, as for collapse of a tunnel, fall of these small \*\*\*\*\* serves as an opportunity. The small force is sufficient for the force of preventing fall of such a small stone, and it can fully prevent fall of a pebble with the blanket-like reinforcement object 14. Therefore, according to this invention, it becomes possible for conventional 3-conventional 4, or the work habits of 3-5, i.e., a steel support, to build, to exclude a lump activity, the blasting activity of concrete, and the placing activity of a rock bolt, and to bring the tunnel progress of work forward, and to aim at shortening of working hours, and a cost cut according to the easy activity of pasting up the blanket-like reinforcement object 14 on the tunnel wall surface 4, and is suitable for the tunneling work of a hard rock especially.

[0014] In addition, although the example explained the case where revolution of an arm 10 performed automatically cleaning of the tunnel wall surface 4, attachment of the blanket-like reinforcement object 14, and heating of adhesives 32 in the activity section 12, of course, this invention is applied, also when doing these activities manually. Moreover, after sticking a blanket-like reinforcement object on a tunnel wall surface, using thermosetting adhesive as adhesives, it was made to heat in the example, but adhesion on the tunnel wall surface of a blanket-like reinforcement object may be performed by pressurizing, after sticking a blanket-like reinforcement object on a tunnel wall surface using quick setting nature adhesives.

[0015]

[Effect of the Invention] It faces placing lining concrete on the tunnel wall surface by which this invention carried out tunnel excavation of the hard rock with shot or a mechanical excavator, excavated, and loose-part-of-rock processing was carried out, and building a tunnel, a blanket-like reinforcement object is stuck on said tunnel wall surface with adhesives, and it fixes to it so that clearly [ in the above explanation ], and a tunnel wall surface is supported with a blanket-like reinforcement object, and said lining concrete was made to place from this blanket-like reinforcement object. Therefore, in the tunneling work of a hard rock, a steel support builds, a lump activity, the blasting activity of concrete, and the placing activity of a rock bolt are excluded, and the tunnel progress of work is brought forward, and working hours are shortened, and it becomes possible to aim at a cost cut.

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JAPANESE

[JP,09-072198,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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CLAIMS

[Claim(s)]

[Claim 1] The tunnel construction approach which carries out as the description in what it faces placing lining concrete on the tunnel wall surface on which tunnel excavation of the hard rock was carried out with shot or a mechanical excavator, it was excavated, and the loose part of rock was processed, and building a tunnel, and a blanket-like reinforcement object is stuck on said tunnel wall surface with adhesives, it fixes to it, a tunnel wall surface is supported with a blanket-like reinforcement object, and said lining concrete was placed for from this blanket-like reinforcement object.

[Claim 2] The tunnel construction approach according to claim 1 that cleaning which removes dust from a tunnel wall surface is performed before sticking said blanket-like reinforcement object on a tunnel wall surface with adhesives.

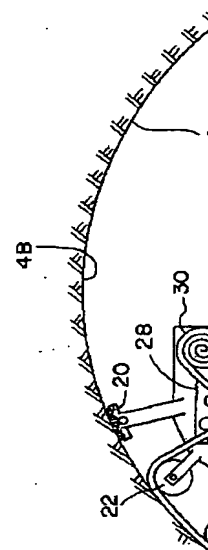
[Claim 3] The tunnel construction approach according to claim 1 pressurized after quick setting nature adhesives are used as said adhesives and a blanket-like reinforcement object is stuck on a tunnel wall surface by adhesives.

[Claim 4] The tunnel construction approach according to claim 1 heated after thermosetting adhesive is used as said adhesives and a blanket-like reinforcement object is stuck on a tunnel wall surface by adhesives.

[Claim 5] Said blanket-like reinforcement object is the tunnel construction approach according to claim 1 of having wrap die length for the both-sides side and top face of a tunnel wall surface at least by predetermined width of face.

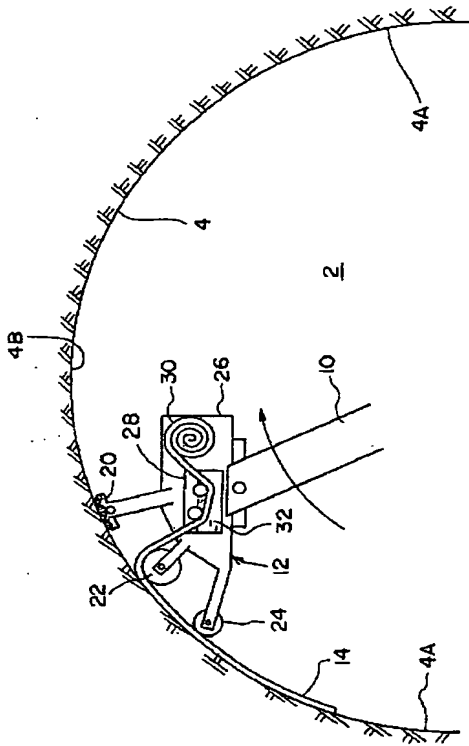
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Drawing  
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